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Aquatic Biology Program at the Environmental Monitoring and Support Laboratory - Cincinnati U.S. Environmental Protection Agency Cincinnati, Ohio

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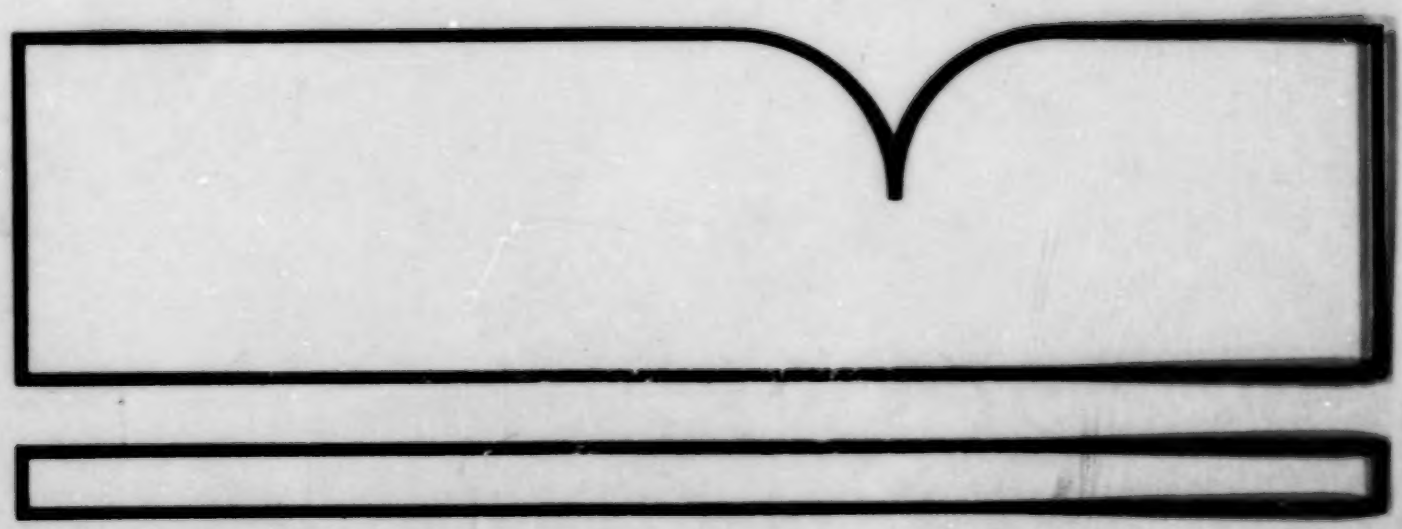

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THE AQUATIC BIOLOGY PROGRAM AT THE ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY - CINCINNATI, U.S. ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO

by

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16. ABSTRACT

This report describes briefly the research activities of the biology staff at EMSL-Cincinnati, Ohio.

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The Environmental Monitoring and Support Laboratory - Cincinnati (EMSL-Cincinnati), under the direction of Robert L. Booth, has as its primary responsibility within the U.S. Environmental Protection Agency the evaluation and standardization of water and wastewater monitoring measurement techniques for use within EPA and state biomonitoring programs.

The Biological Methods Branch, under the direction of Dr. Cornelius I. Weber, develops, improves, evaluates, standardizes and publishes methods for viruses, bacteria, phytoplankton, macrophyton, macroinvertebrates and fish for use in water and wastewater monitoring.

The Aquatic Biology Section develops methods for field and laboratory studies for use in detecting violations of water quality standards, evaluating the trophic condition of surface waters and wastes, and measuring the effects of domestic and industrial wastes on aquatic life. Research projects carried on by the Section involve the development, evaluation, and standardization of methods for sample collection and preservation; organism identification and enumeration; measurement of biomass and metabolic rates; measurement of toxicity and bioaccumulation of toxic substances; data analysis and interpretation; and preparation of biological quality assurance guidelines.

In August 1981, the Aquatic Biology Section moved into the former Newtown Fish Toxicology Station at Newtown, Ohio, which was a satellite facility of the Environmental Research Laboratory - Duluth. The staff at the Station, including its Director, William B. Horning, was transferred to the Aquatic Biology Section of EMSL-Cincinnati. Mr. Horning assumed the responsibility of Chief of the Section in January 1983.

The Quality Assurance Branch of the Environmental Monitoring and Support Laboratory - Cincinnati has the responsibility of providing quality assurance support for all aquatic biology, as well as microbiological, virological and chemical analyses performed for water and wastewater programs. This support includes providing reference materials, chemicals, standards and standard test organisms; providing quality control guidelines; conducting collaborative validation studies to establish precision and accuracy; and conducting regular performance studies to evaluate the ability of laboratories to perform the required analyses.

The following researchers are presently involved with the Aquatic Biology Program at EMSL-Cincinnati.

William B. Horning is Chief of the Aquatic Biology Section. He has been involved in developing the use of aquatic toxicity tests to determine toxicity reduction by municipal and industrial wastewater treatment processes. He has participated in cooperative studies with the Industrial Environmental Research Laboratories - Cincinnati and Research Triangle Park in developing effluent guidelines for various industrial categories. He has also participated in cooperative studies with the Municipal

Environmental Research Laboratory - Cincinnati, to determine the effectiveness of pilot-scale treatment processes to treat and detoxify municipal wastewaters spiked with organic priority pollutants. A current project is editing, in collaboration with Cornelius I. Weber, a manual entitled, "Methods for Measuring Chronic Toxicity of Effluents and receiving waters to Freshwater Organisms."

Quentin H. Pickering is an Aquatic Biologist whose primary area of research is in the field of fish toxicity to develop water quality criteria for freshwater fish. Current research is in the field of biological methods standardization to evaluate the chronic toxicity of complex wastewaters to fish.

Tim Neiheisel, Aquatic Biologist, has been involved the last ten years in acute, subacute, subchronic and chronic toxicity testing of industrial and municipal wastewaters. The work in the last five years has been done in cooperation with, and the support of, projects of the Industrial Environmental Research Laboratory and Municipal Environmental Research Laboratory at the U.S. Environmental Protection Agency's Test and Evaluation Facility in Cincinnati, Ohio. His present research involves monitoring and technical direction of toxicity reduction studies using seven-day Ceriodaphnia chronic and fathead minnow larval growth and survival tests to evaluate the performance of wastewater treatment systems and to evaluate and standardize the tests and procedures for conducting such studies.

Ernest L. Robinson, an Aquatic Biologist, has been conducting static bioassays with selected algal species and Lemna to determine the toxic effects of selected reference toxicants. The test methods and the results are being evaluated and validated so that there is assurance that representative and accurate measurements of the toxicity of the reference toxicants have been achieved by the methods. The final aim is to have these test procedures used as Agency standards for measuring the effect of complex and variable wastes on aquatic organisms.

Donald J. Klemm is a Research Aquatic Biologist whose current research involvement and other activities are as follows: develops, evaluates and standardizes culturing methods and bioassay methods for measuring acute and chronic toxicity of effluents and surface waters to the marine fish, Menidia beryllina; serves as a consultant on the taxonomy, ecology, and pollution tolerance of freshwater annelids and other invertebrates, and methods of collection and analyzing invertebrate samples; serves as a member of the Environmental Monitoring and Support Laboratory evaluation team and performs on-site laboratory evaluations of the biological quality assurance programs of USEPA regional laboratories; provides technical advice and assistance on biological field and laboratory methods; serves as a member of Subcommittee D-19.23 on Biological Field Methods and Committee E-47 on Biological Effects and Environmental Fate of ASTM (American Society for Testing and Materials); serves as chairman for macroinvertebrates, also of ASTM (Task Group D-19.23.05), in the preparation of standard guides for selecting the use of grab, stream-net, or artificial substrate sampling devices to collect benthos; serves as a group member in the development of the benthic macroinvertebrates section

for Standard Methods; helps prepare an annual bibliography of current technical literature on aquatic invertebrate biology and methodology, and prepares bibliographies on Hirudinea and Toxicology for the North American Benthological Society.

Philip A. Lewis has been with the aquatic biology program since 1966. His duties include development, evaluation and standardization of methods for invertebrate bioassays, and for the collection of invertebrate samples in intensive surveys to determine the effect of pollutants on aquatic life in receiving waters. He provides technical advice on field and laboratory methods for invertebrates to other EPA, Federal and state water and wastewater monitoring programs and on invertebrate effluent toxicity tests and related methodology. He provides technical information on the taxonomy, ecology and pollution tolerance of aquatic invertebrates to Federal, state and other agencies engaged in water monitoring programs. Phil and Bill Bingham, Biological Laboratory Aid, are presently engaged in studies leading to the standardization of Daphnia and Ceriodaphnia acute and chronic toxicity tests for effluents. Phil has the responsibility of keeping the species lists updated for the computerized biological data management system (BIO-STORET). He also prepares an annual bibliography of current technical literature on aquatic invertebrate biology and methodology and helps prepare the annual bibliography on Toxicology for NABS.

Gary B. Collins, Aquatic Biologist, with the Quality Assurance Branch, EMSL-Cincinnati, has the responsibility for developing quality assurance materials for: (1) Methods used by biologists in evaluating toxicity of effluents and surface waters and, (2) In evaluating the biological integrity of aquatic systems. He serves as Chairman of the Task Group on Phytoplankton for Standard Methods and provides technical assistance related to chlorophyll analysis and the identification of diatoms and other freshwater algae. Current projects include the development of a series of quality control (QC) samples for algal identification, a QC sample that evaluates the entire chlorophyll method, and production of reference toxicants for bioassay use.